inflator means arranged at least partially within said interior space of said system housing for inflating said at least one airbag, said inflator means comprising an inflator housing containing propellant, and

a crash sensor for initiating inflation of said at least one airbag via said inflator means upon a determination of a crash requiring inflation of said at least one airbag,

said crash sensor comprising

a sensor housing arranged proximate to said inflator housing, and

a sensing mass arranged in said sensor housing to move relative to said sensor housing in response to accelerations of said sensor housing resulting from the crash into the first side of the vehicle such that upon movement of said sensing mass in excess of a threshold value, said crash sensor initiates said inflator means to inflate said at least one airbag.

28 27

~~29~~. (Amended) The [system] vehicle of claim ~~28~~ wherein the threshold value is [the] a maximum motion of said sensing mass required to determine that a crash requiring deployment of said at least one airbag is taking place.

Please add the following new claims.

6 ~~30~~. The vehicle of claim 3, wherein said generating means comprise at least one piezoelectric element.

17

~~31~~. The vehicle of claim 1, wherein said sensor housing is exterior of said inflator housing.

REMARKS

Reconsideration of the present application, as amended, is respectfully requested.

Claims 1-29 and new claims 30 and 31 are presently active in this application.

Information Disclosure Statement

It is pointed out that all of the U.S. patents listed in the list of references submitted with the applicant's Information Disclosure Statement were indeed cited during the prosecution of the

parent application. In this regard, all of the patents are set forth in the References Cited section of U.S. Pat. No. 5,842,716 (the cover page of which is attached hereto). One minor correction is that the first listed patent should be U.S. Pat. No. 4,580,810 instead of 4,580,820. For those references cited in the parent application, it is not necessary to submit a copy in order to have the Examiner consider the same (see 37 C.F.R. §1.98(d)).

Thus, consideration of all of the patents in the list of references submitted with the Information Disclosure Statement is respectfully requested. If there is a remaining problem that prevents the Examiner from considering the references, the Examiner is respectfully requested to contact the undersigned to discuss the same.

Drawings

The specification has been amended to revise the description of Fig. 5 in light of the Examiner's comments.

Proposed revised Fig. 1 is submitted herewith in which the lead line for reference numeral 160 touches the plate (the change being marked in red ink).

Proposed revised Fig. 2 is submitted herewith in which the designation of the mounting plate has been changed from 130 to 160. Also, the drawing has been inverted to be consistent with Fig. 1. The shape of the plate 160 in Fig. 2 has also been changed to be consistent with the shape of the plate in Fig. 1.

It is noted that reference numeral 636, a firing pin, is shown in Fig. 6 (in the center of the drawing).

The specification has been amended at page 17, line 30 as suggested by the Examiner.

Proposed revised Figs. 13 and 14 are submitted herewith in which the drawings are in the proper orientation, i.e., the airbags face sideward.

In view of the submission of proposed revised Figs. 1, 2, 13 and 14 and the changes to the specification, it is respectfully submitted that the Examiner's objection to the drawings has been overcome and should be removed.

Specification

The specification has been amended at pages 2, 6, 14 and 18-21 to obviate the informalities noted by the Examiner. With respect to the changes to page 14, it is noted that the sensor housing 101 is sealed when in combination with the inflator assembly 120 since the inflator assembly 120 covers the orifice 127 in the bottom cover 151 of the sensor housing 101.

With respect to the description at page 20, lines 3-6, proposed Fig. 9 is submitted herewith in which the lead line from reference numeral 990 has been changed to lead to the area between the sensor can 970 and the housing section of the inflator assembly (the change being marked in red ink).

In view of the changes to the specification and the submission of proposed revised Fig. 9, it is respectfully submitted that the Examiner's objection to the disclosure has been overcome and should be removed.

Rejection of Claims 7, 8, 13 and 29 under 35 U.S.C. §112

Claims 7, 8, 13 and 29 were rejected under 35 U.S.C. §112, second paragraph, in view of informalities in these claims.

Claims 7 and 8 have been amended to change the term "electronic sensor" to "crash sensor" for which antecedent basis is provided. Claim 7 has also been amended to include "a" before "micro-machined" as suggested by the Examiner.

Claim 13 has been amended to remove the recitation of the inner and outer panels not being associated with a door of the vehicle. The embodiment set forth in claim 13 is shown in Fig. 16, wherein module 1602 is described as being mounted between the inner and outer side panels at a location other than the door to protect a rear-seated occupant. It must be recognized that, for example, in two-door cars, the door does not extend fully alongside the rear seat. As such, there will be outer and inner panels of the frame that are fixed in position relative to the frame and are not pivoted relative to the frame, as is a door. The recitation of the inner and outer panels not being associated with the door was intended to encompass such a situation.

However, for clarification purposes, claim 13 has been amended to recite that the inner and outer panels are "fixed in position relative to the frame", i.e., not doors which are movable

(pivotable) relative to the frame. The specification has also been amended at page 24 to clarify this feature.

In this regard, it is noted that an embodiment wherein panels are associated with a door is shown in both Fig. 16 (module 1601) and in Fig. 12 (airbag system 1200). The specification has been amended at page 20 to clarify the arrangement of the airbag system 1200 between the inner and outer side panels of the door. Proposed revised Fig. 12 is also submitted herewith with some additional reference numerals.

It is respectfully submitted that the presentation of proposed revised Fig. 12 and the changes to the specification at pages 20 and 24 do not introduce new matter.

Claim 29 has been amended to positively recite the "maximum motion" of the sensing mass required to determine that a crash requiring deployment of the airbag(s) is taking place.

In view of the changes to claims 7, 8, 13 and 29, it is respectfully submitted that the Examiner's rejection of these claims under 35 U.S.C. §112, second paragraph, has been overcome and should be removed.

Double Patenting

Claims 1-29 were rejected under the judicially created doctrine of double patenting over claims 1-4 of U.S. Pat. No. 5,842,716.

Although applicant appreciates the Examiner's recognition that the subject matter claimed in the instant application is fully disclosed in the '716 patent, the Examiner's rejection is respectfully traversed for two reasons.

First, independent claims 1, 16, 22 and 28 have been amended to claim a vehicle including a self-contained airbag system whereas claims 1-4 of the '716 patent are directed to a self-contained airbag system per se. Thus, the claims are not claiming common subject matter.

Second, the claims of the '716 patent recite that the mass is attached to a side wall of the sensor housing by a hinge (see col. 11, lines 45-46, col. 12, line 9 and lines 37-38). The claims of the instant application do not specify this feature and thus the claims of the instant application are not claiming common subject matter as claims 1-4 of the '716 patent.

In view of the foregoing arguments, it is respectfully submitted that the Examiner's rejection of claims 1-29 on the grounds of double patenting in view of claims 1-4 of the '716 patent has been overcome and should be removed.

Rejections on the Merits

Claims 1, 6, 10, 12, 13, 28 and 29

Claims 1, 6, 10, 12, 13, 28 and 29 were rejected under 35 U.S.C. §102(b) as being anticipated by Breed (U.S. Pat. No. 4,666,182).

It is respectfully submitted that all of the elements of independent claims 1 and 28 as amended are not found, either expressly or inherently described, in Breed and therefore Breed cannot anticipate the inventions set forth in these claims nor the inventions set forth in dependent claims 6, 10, 12, 13 and 29.

The preamble of claims 1 and 28 has been amended to be directed to a vehicle including a side impact airbag system, front wheels, rear wheels and a frame defining a front of the vehicle, a rear of the vehicle and first and second sides of the vehicle. As such, the recitation of the system housing of the airbag system being arranged "on the first side of the vehicle alongside at least a portion of a passenger compartment of the vehicle" is not a functional statement of intended use, but rather, is entitled to patentable weight.

Breed does not teach or suggest an airbag system including a system housing arranged on a side of the vehicle alongside the passenger compartment as now set forth in independent claims 1 and 28 and thus does not anticipate these inventions nor the inventions of dependent claims 6, 10, 12, 13 and 29.

Furthermore, with respect to claim 12, since a vehicle is now claimed, the recitation of the system housing being arranged inside a door of the vehicle is entitled to patentable weight and is not disclosed in Breed. With respect to claim 13, the recitation of the system housing being arranged between inner and outer panels on a side of the vehicle and fixed in position relative to the frame is entitled to patentable weight and is not disclosed in Breed.

Claims 2-4 and 14

Claims 2-4 and 14 were rejected under 35 U.S.C. §103(a) as being unpatentable over Breed in view of Merhar.

It would not have been obvious to one of ordinary skill in the art at the time the invention was made to modify the crash sensor of Breed to include an electronic sensor as taught by Merhar in view of a significant difference between the position of the crash sensor of Breed and the crash sensor of Merhar. The crash sensor of Breed, the sensor-initiator 10, is designed to be mounted entirely outside of the crush zone of the vehicle (col. 2, lines 39-41). By contrast, the crash sensor of Merhar is intentionally mounted in the crush zone so that the crystal 10 is compressed between the mass 43 and the vehicle 41 in response to a crash. Mounting the crystal 10 outside of the crush zone as in Breed would not result in a compressive force being applied to the crystal and thus would negate the entire operability of the crash sensor of Merhar.

In sum, the crash sensor of Merhar is not designed to be mounted in the same location as the crash sensor of Breed and thus one skilled in the art would not be motivated to substitute the crash sensor of Merhar for the crash sensor of Breed or include the crash sensor of Merhar in the Breed system.

Moreover, claims 2-4 and 14 include all of the limitations of claim 1. Merhar does not overcome the deficiencies of Breed vis-à-vis the arrangement of the system housing on a side of the vehicle and therefore, one could not combine Breed and Merhar and arrive at the inventions set forth in claims 2-4 and 14.

Accordingly, it is respectfully submitted that the Examiner's proposed combination of Breed and Merhar is untenable and that the Examiner's rejection of claims 2-4 and 14 under 35 U.S.C. §103(a) in view of this combination has been overcome and should be removed.

Claims 5-7, 9, 11, 16-19, 21-24, 26 and 27

Claims 5-7, 9, 11, 16-19, 21-24, 26 and 27 were rejected under 35 U.S.C. §103(a) as being unpatentable over Breed in view of Spies et al.

Claims 5-7, 9 and 11

With respect to claims 5-7, 9 and 11, these claims include all of the limitations of claim 1. Spies et al. does not overcome the deficiencies of Breed vis-à-vis the arrangement of the system

housing on a side of the vehicle and therefore, one could not combine Breed and Spies et al. and arrive at the inventions set forth in claims 5-7, 9 and 11.

Moreover, with respect to claim 9, this claim recites that the inflator means comprise a primer arranged in the inflator housing (with the propellant) and forming part of an electronic circuit. In Spies et al., the primer is not arranged in the same housing as the propellant. Rather, it is an explicit feature of the Spies et al. system to separate a housing containing the solid fuel from a housing containing the ignition means (see col. 2, lines 7-21). This is achieved by providing a first closed housing 1 including the ignition means and primer 4 and a second housing 7 including the tablets of solid fuel 10.

In contrast to Spies et al., in the invention set forth in claim 9, the primer is arranged in the same housing as the propellant, whereby the electronic sensor is arranged in a separate sensor housing. Spies et al. clearly teaches away from this construction.

In view of the foregoing, it is respectfully submitted that claims 5-7, 9 and 11 are not taught or suggested by Breed and Spies et al., in combination, and further that one skilled in the art could not, and in any event would not be motivated to, combine Spies et al. and Breed and arrive at the inventions set forth in claims 5-7, 9 and 11.

Claims 16-19, 21-24, 26 and 27

With respect to claims 16-19, 21-24, 26 and 27, it is respectfully submitted that one skilled in the art would not be motivated to combine the sensor of Spies et al. with the airbag safety restraint system of Breed in view of a particularly (and allegedly) novel feature of the Spies et al. sensor.

In particular, Spies et al. is designed to provide a restraint system with two separate closed housings that facilitate storage, assembly and environmentally safe disposal. The first housing includes the solid fuel tablets and the second housing includes the sensor, triggering element and ignition structure (see the Abstract). It is alleged that in the prior art, the igniter/primer is structurally integrated with the gas generator housing resulting in electrical and chemical problems (see column 1, lines 45-62). Thus, Spies et al. provides a solution to these problems by having the two housing which are in non-use, separated from one another and thus cannot come into contact with each others fillings other than at will (see column 2, lines 15-21).

In Breed, the sensor housing is inside the inflator housing (as admitted by the Examiner). As a result of this positioning, there is a significant possibility of the firing pin 66 impacting the primer 36 resulting in unintentional inflation of the airbag.

In view of the express desire in Spies to provide the sensor housing separate from the inflator housing and the presence of the sensor housing within the inflator housing in Breed, one skilled in the art would not be motivated to substitute the sensor housing (and sensor) of Spies et al. for the sensor in Breed.

Furthermore, with respect to claims 21 and 26, in Spies et al., the primer is not arranged in the same housing as the gas generating material that causes inflation of the airbag. Rather, it is an explicit feature of the Spies et al. system to separate a housing containing the solid fuel from a housing containing the ignition means (see column 2, lines 7-21).

In view of the foregoing, it is respectfully submitted that claims 16-19, 21-24, 26 and 27 are not taught or suggested by Breed and Spies et al., in combination, and further that one skilled in the art could not, and in any event would not be motivated to, combine Spies et al. and Breed and arrive at the inventions set forth in these claims.

Claims 8, 20 and 25

Claims 8, 20 and 25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Breed in view of Merhar and Spies et al.

In the embodiments set forth in these claims, the sensor includes a sensing mass responsive to acceleration of the sensor housing and a piezo-electric element for generating a signal representative of the movement of the sensing mass. This particular construction is not disclosed in any of Breed, Merhar or Spies et al. or an obvious variation of the sensors shown in these patents. As such, one could not combine the purported teachings of these patents and arrive at the inventions set forth in claims 8, 20 and 25

Claim 15

Claim 15 was rejected under 35 U.S.C. §103(a) as being unpatentable over Spies et al in view of Breed and Midorikawa et al.

Claim 15 includes all of the limitations of claim 1. Spies et al., Breed and Midorikawa et al. do not disclose the arrangement of the system housing on a side of the vehicle as set forth in

claim 1 and therefore, one could not combine these patents and arrive at the inventions set forth in claim 15.

In view of the changes made to the claims and the arguments presented above, it is respectfully submitted that the Examiner's rejections of the claims have been overcome and should be removed and that the present application is now in condition for allowance.

If the Examiner should determine that minor changes to the claims to obviate informalities are necessary to place the application in condition for allowance, the Examiner is respectfully requested to contact the undersigned to discuss the same.

An early and favorable action on the merits is earnestly solicited.

FOR THE APPLICANT
Respectfully submitted,

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Enc.
Fee Transmittal Form
Proposed revised Figs. 1, 2, 9, 12, 13, 14
Cover page of U.S. Pat. No. 5,842,716

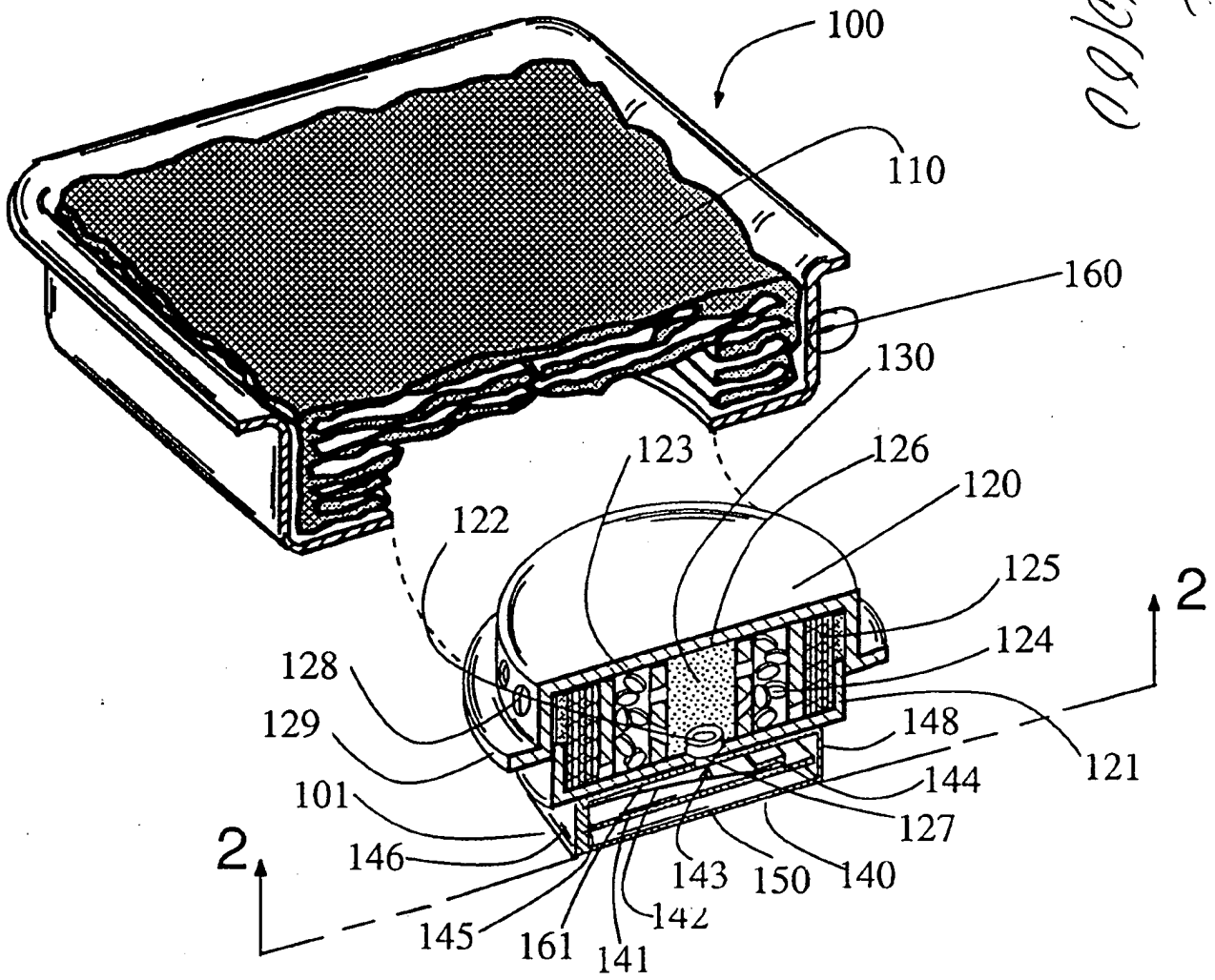
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FIG. 1

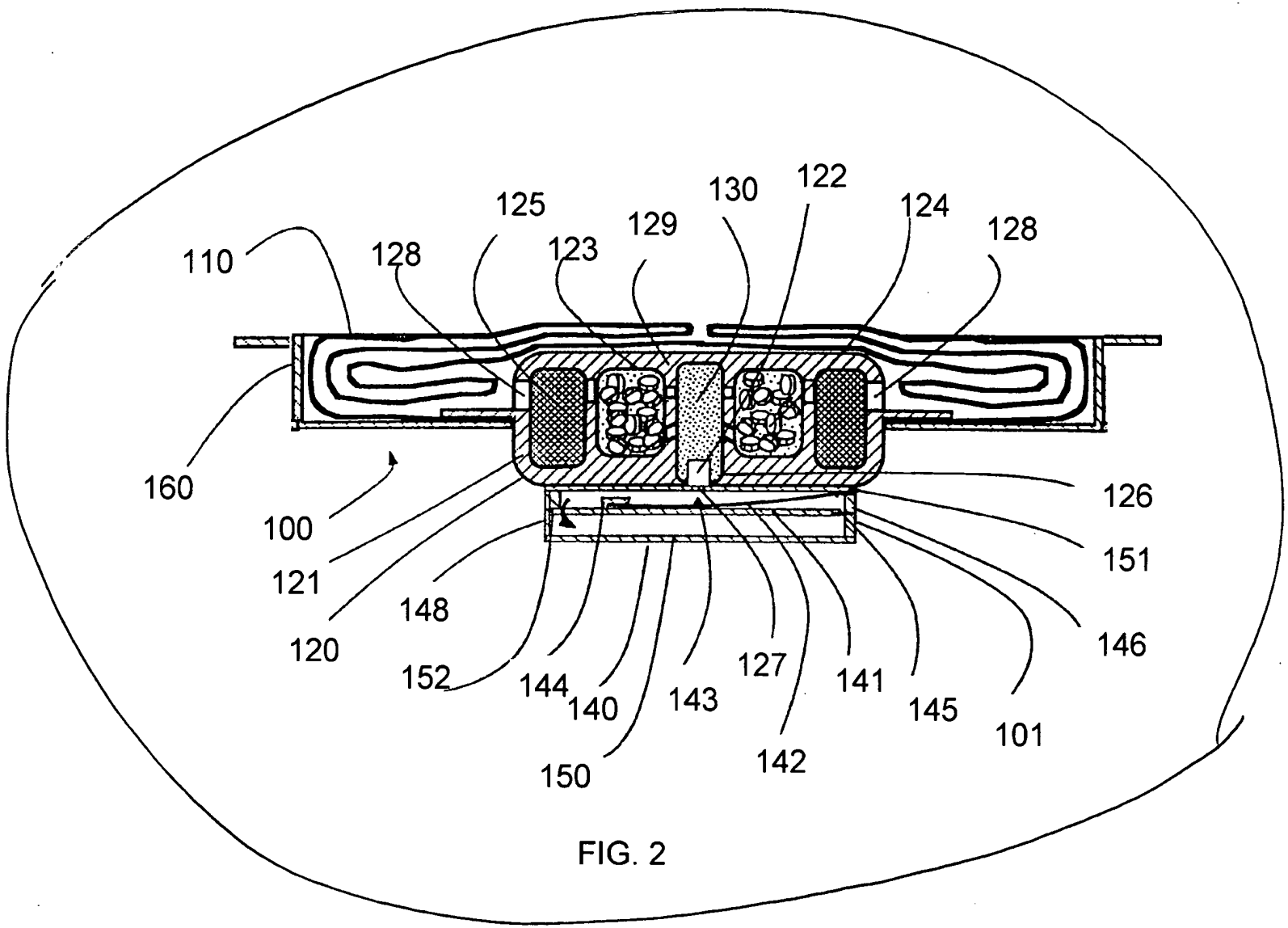
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FIG. 2

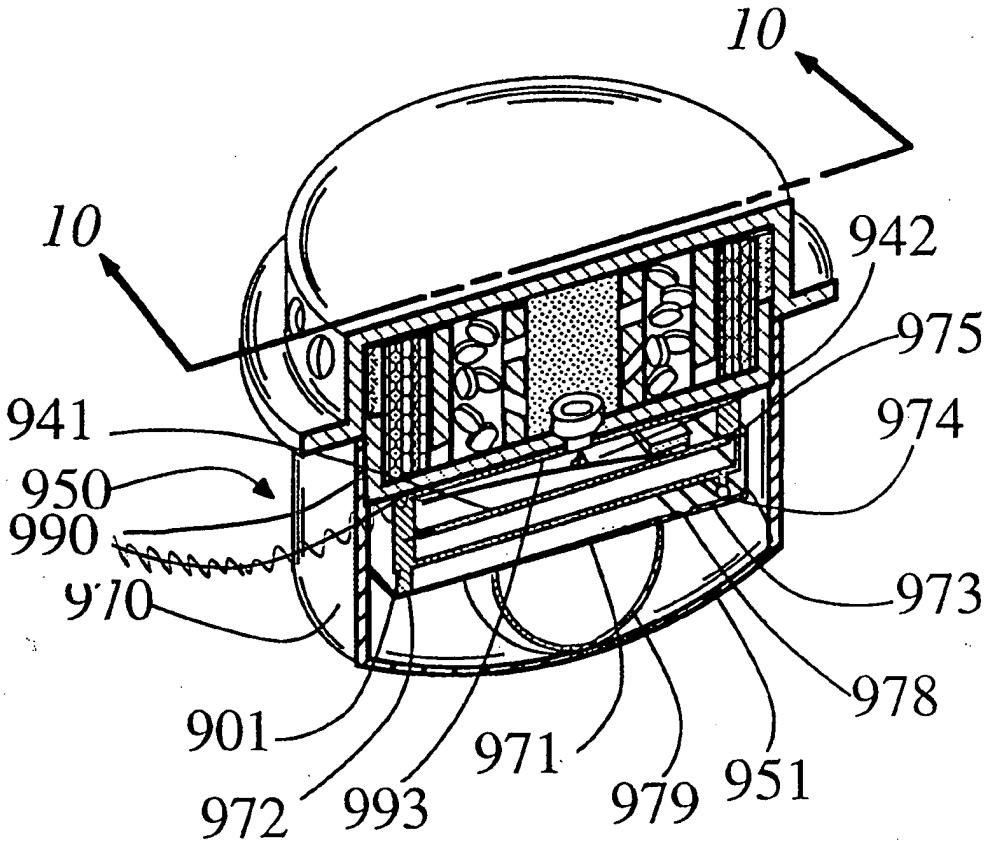

FIG. 9

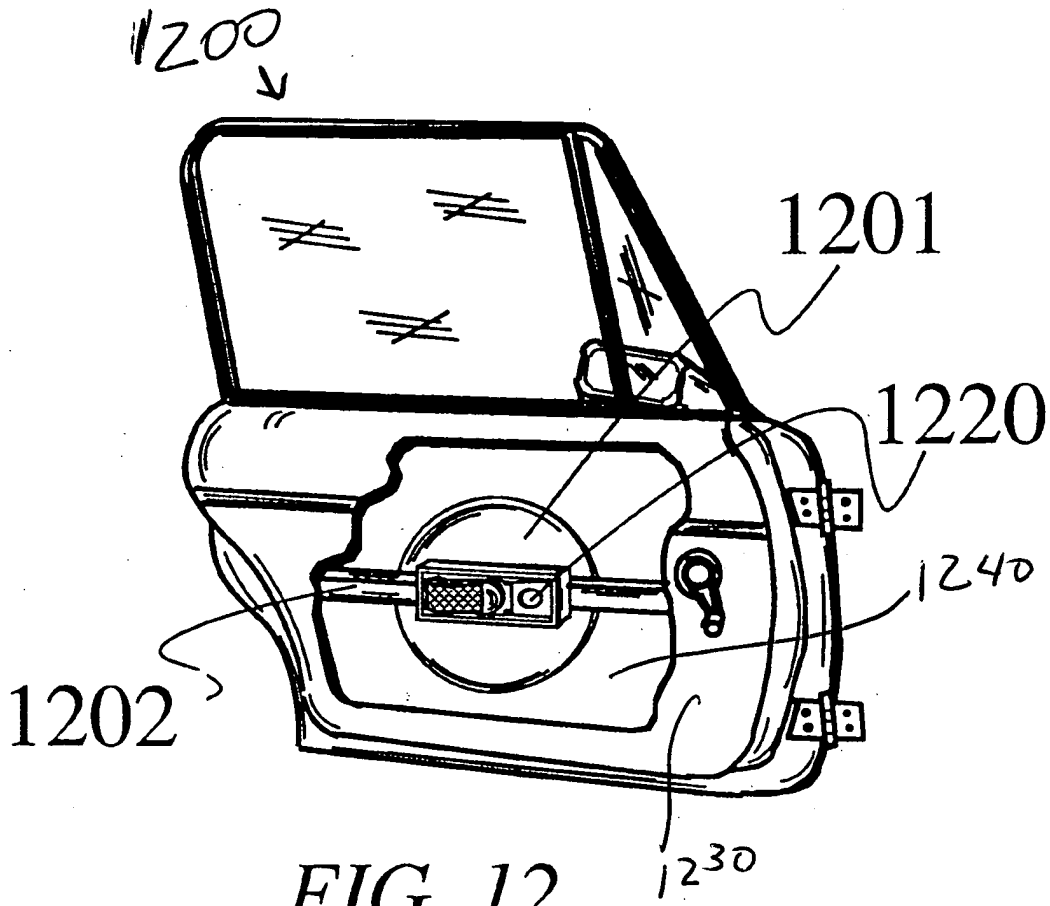

FIG. 12

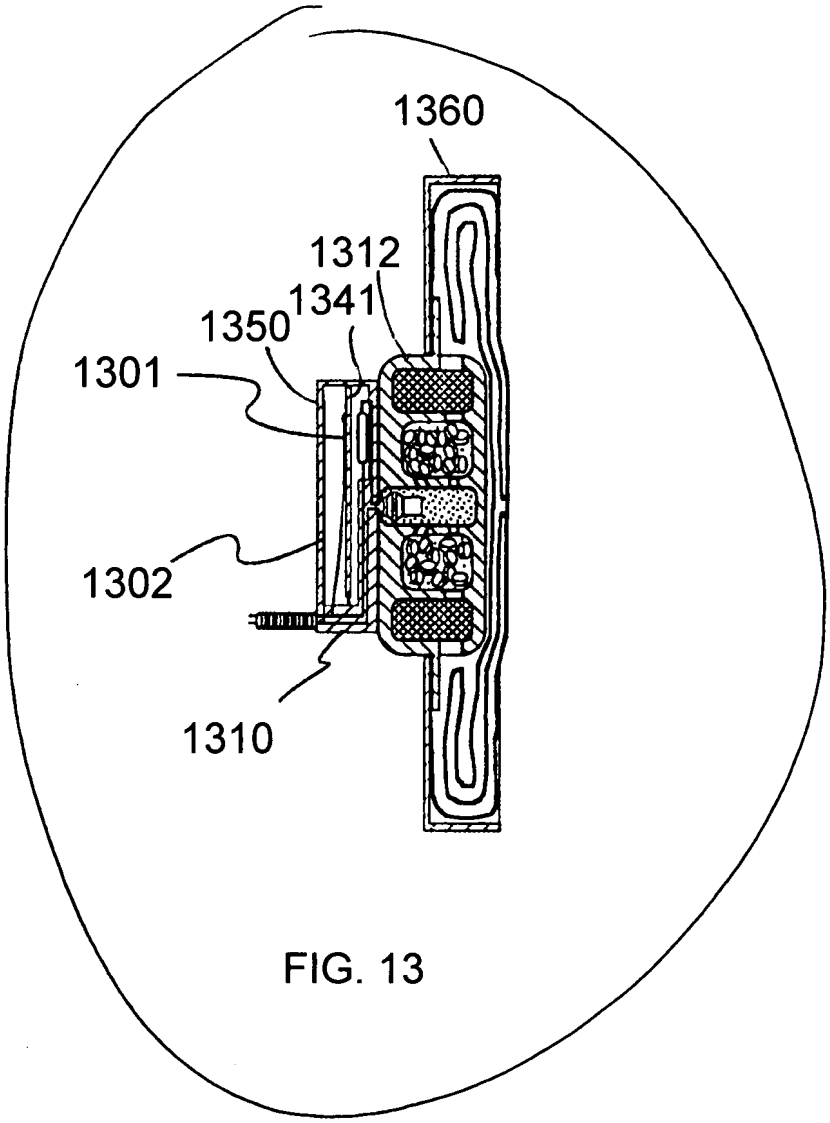

FIG. 13

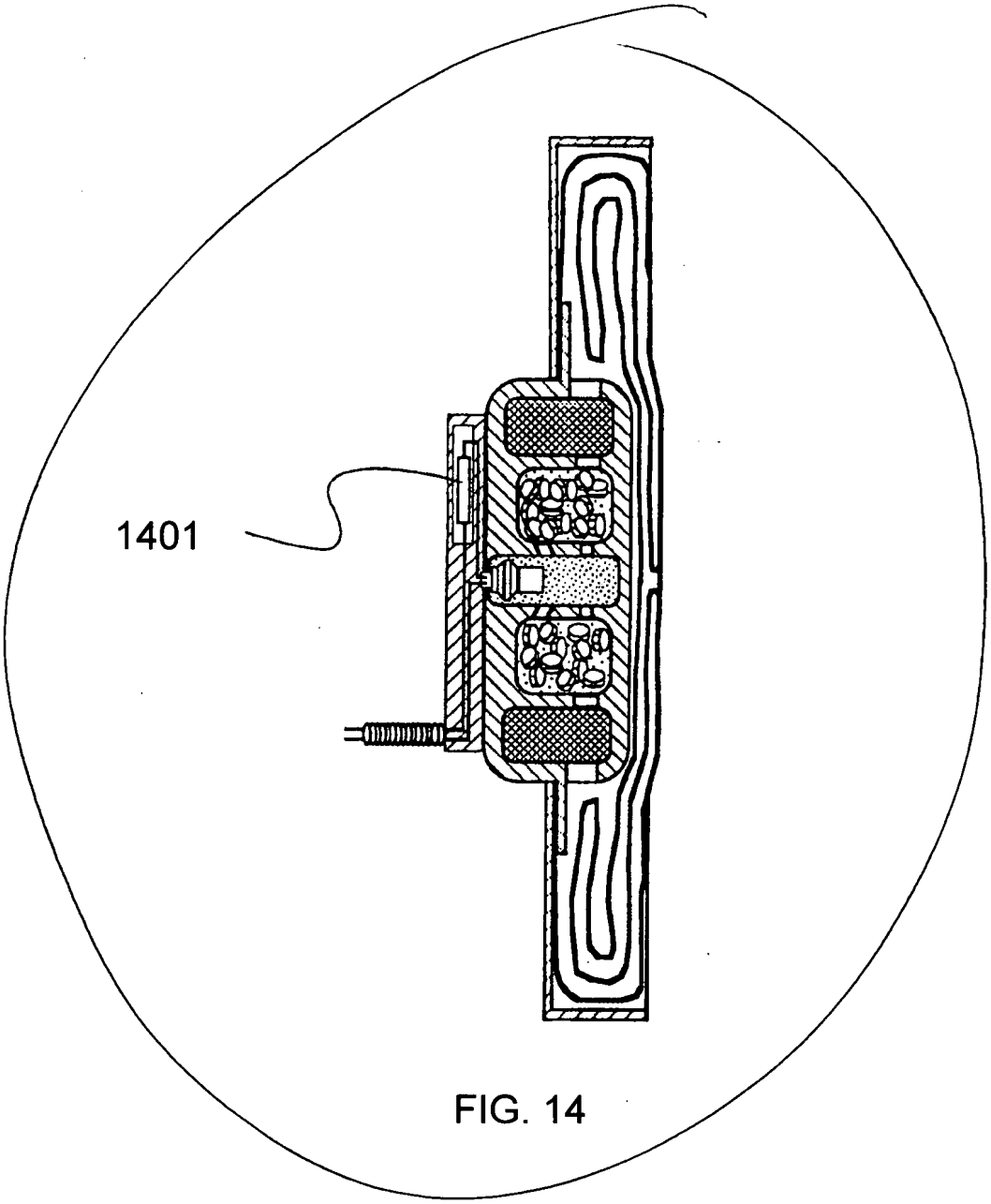

FIG. 14